

The Gender Imbalance in Participation in Canadian Universities (1977-2003)¹

Louis N. Christofides

Department of Economics, Universities of Cyprus and Guelph

Kallipoleos75, P. O. Box 20537, Nicosia 20537, CYPRUS (louis.christofides@ucy.ac.cy)

Michael Hoy

Department of Economics, University of Guelph

Guelph, Ontario, N1G 2W1, CANADA (mhoy@uoguelph.ca)

Ling Yang

Department of Economics, University of Guelph

Guelph, Ontario, N1G 2W1, CANADA (yling@uoguelph.ca)

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Abstract

Data from the Survey of Consumer Finances and the Survey of Labour and Income Dynamics indicate that more females than males have been attending Canadian Universities over the past decade. This gender imbalance in the attendance rates of females and males increased substantially during the 1990s. Various decomposition techniques are applied, using linear and nonlinear regression techniques, to investigate the factors that explain this imbalance. It is found that the higher university premium for females and its increase relative to that for males explains a large part of the imbalance in the university attendance.

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1. Introduction

It has been recognized for some time that females represent an increasingly large share of the student body attending university. For most developed countries, this trend started in the mid to late 1990s. Canadian universities have also experienced a dramatic change in the participation rate of females relative to males. Table 1 illustrates this trend by tabulating the postsecondary (university or college) participation ratio of children aged between 17 and 24 for Canadian families for selected years. As shown in Table 1, the rates of college attendance for females and males have been relatively close to each other over this time period. Averaging the proportion of female children that attend college across all families by year, this average was 0.10 in 1977 relative to 0.09 for male children. These numbers diverged somewhat particularly in the 1990s but they ended up the same, at 0.20, by 2003. However, the trend for university participation by gender was very different. The participation rates of females and males were, at 0.12 and 0.11 respectively, nearly equal in 1977. By 2003, about 31% of female children between 17-24 years of age attended university, an increase of 158.3%. The proportion for male attendance reached 0.20 in 2003, an increase of only 81.8%. Figure 1, illustrates the generally close trajectories followed by the two genders for college attendance, as well as the diverging paths for university attendance. Women now represent the majority of postsecondary education students on both college and university campuses. In Canada, for example, for the academic year 2000-2001, the enrolment of women at colleges and universities reached 59% of total enrolment (Canadian Information Center for International Credentials (2004)).

The purpose of our study is to investigate the reasons for the unbalanced growth in university attendance over this period. We do this by addressing several questions: (1) What are main factors that determine attendance at university? (2) Do these factors affect the participation decision differently for males and females? (3) What are the causes of the increasing divergence between male and female attendance at university? (4) Can these causes be classified into short-run, temporary, forces and long-run ones which are likely to alter the gender balance of the skilled workforce?

To answer these questions, we use the Statistics Canada master files for the Survey of Consumer Finance (SCF) and the Survey of Labour and Income Dynamics (SLID) to investigate the determinants of female and male university attendance over the period 1977 to

2003. We concentrate on university, rather than college, attendance because it is with respect to the former that a major gender ‘imbalance’ has appeared.

Factors, such as family income, tuition fees, the family head’s education and location are all known to be important forces in explaining the participation decision. However, while these factors influence female and male behaviour differently, they cannot account for the gender divergence in university participation documented in Figure 1. By contrast, the additional income accruing to those holding university degrees rather than high school certificates (the ‘university premium’) differs by gender over our time period and evolves in an interesting way. For the period under study, the university premium increases for both genders but particularly so for females. For the years 1977 to 1992 the female university premium was 16% higher than that for males, while for the period 1993 to 2003 it was 22% higher. Following extensive statistical work and the application of new decomposition techniques, it appears that most of the explainable gender imbalance in attending university comes from the increasing difference in the university premium between women and men.

A substantial amount of research, attempting to explain the causes of the gender imbalance in attending university, can be found for the US and some other OECD countries but only limited research has been carried out for Canada. Jacob (2002) explores the gender imbalance of postsecondary education attendance by using longitudinal US survey data and concludes that two factors, viz. non-cognitive ability and returns to higher education, help explain most of the gender imbalance in the US. Our data set does not include information on non-cognitive abilities. This factor may well explain why, at any point in time, women are more likely to be successful in their application to university. Nevertheless, it is hard to believe that this force may explain the widening gender imbalance found in our data over time. It seems unlikely that non-cognitive abilities between female and male children have diverged substantially over time. It is possible that the importance of these abilities in schooling outcomes has changed over time but these forces are not ones that we can examine with our data. As noted above, we do investigate the significance of the university premium. To our knowledge, Johnson and Rahman (2005) is the only other Canadian study taking this factor into consideration. In their research, which was based on the Labour Force Survey (LFS) covering the years 1976-2003, the return to university education is found to have a positive, albeit not statistically significant,

effect on university participation. Although male and female individuals are separated for regression purposes, the gender imbalance issue is not explicitly addressed in that study. Finally, the LFS does not include important information, such as family income, that helps shape the university participation decision. Finnie *et al* (2005) also investigate the determinants of attending postsecondary institutions in Canada. Family background variables appear to be important determinants of participation in postsecondary education. Although gender-specific regression results are presented in their work, they do not explicitly address the gender imbalance issue. Moreover, their study does not include information about tuition fees which have increased dramatically since the mid-1990's.²

To try to explain the increasing gender imbalance in university attendance, we use linear probability and logit models to explain university attendance for each gender. We analyze estimates from these models in the context of the Blinder-Oaxaca decomposition techniques applied to linear probability models. We also use the techniques recently proposed by Fairlie (1999, 2006) to construct similar decompositions in the context of logit models. We find that most of the imbalance in gender participation can be explained by the difference in the characteristics of the two genders. Within these characteristics, the main factor appears to be the difference between the female and male university premium. Other characteristics also contribute to explaining the gender imbalance and an unexplained component remains.

In section two, we present more details on the trends in female and male participation rates. In section three, data and variables used in this study are explained in detail. In section four, results are presented and analyzed. In section five, a summary and some concluding comments are provided.

2 Female and Male Trends in University Attendance

As noted in Table 1, the university participation rates for both females and males have been increasing over time but the former have been increasing at a higher rate. In Tables 2 and 3³, the

² The literature related to the effect of tuition fees on Canadian postsecondary education enrolment includes Christofides, Cirello and Hoy (2001), Rivard and Raymond (2004), Junor and Usher (2004), Johnson and Rahman (2005), Neill (2005), Coelli (2005), and Fortin (2005).

³ Use of the master files of the SCF and SLID allowed us to reduce the age of children under consideration from 18 to 17, thus extending the relevant age bracket (17 to 24).

participation rates for female and male children for families in different income quintiles are presented for selected years.⁴ At the beginning of our sample, the participation rate for females, in Table 2, is higher than that for males, in Table 3, for the highest three quintiles only. By 1985, the female participation rate is uniformly higher than that for males and, by the end of our sample period, the rate in the first quintile is 0.25 for females and 0.14 for males. This point is stressed in Table 4, where the relative likelihood of participation across income quintiles is reported. In 1977, the relative likelihood (the proportion in the fifth quintile divided by the first quintile) for females and males was, at 3.65 and 3.39 respectively, quite close. This value shrank faster for females than for males and, by 2003, the corresponding values were 1.62 for females and 2.66 for males. This suggests that family income plays an important and gender-specific role in explaining the university participation decision.

However, family income is not the sole factor influencing individual participation decisions. Tables 5 and 6 present the participation patterns for female and male children given the absolute value of family income over time. In any given year, an individual from a family with higher income is more likely to go to university regardless of gender. However, it is also clear that even in a given income bracket, there is an increasing trend for university attendance over time. This trend is stronger for females than for males, especially for lower-income families. This suggests that some other (time-variant) variables, in addition to family income, should be included in analyses of these issues.

Table 7 shows the university premium (defined in section 3) calculated for all the years under investigation. In each and every year in the sample, the female university premium is higher than the male premium. Both premiums increase over time, but the female premium tends to increase more than the male one. Column 5, Table 7, shows the ratio of the female to the male premium. It was 1.15 in 1977 and, following some fluctuations, it ended up at 1.28 by 2003. The ratio was clearly higher in the latter half of the sample than in the early years. Since the premium influences the incentive to attend university, it is important to take its behaviour into account as we attempt to understand why women have shown an increasing interest in university education as compared to men.

⁴ The sampling weight provided by each survey is included in the calculation of means in order to provide more accurate values.

The Canadian university system imposed dramatic increases in tuition fees over the last two decades. In general terms, real tuition fees have doubled over the general period under discussion. The implied increase in the cost of obtaining a university education represents a time-variant change that may moderate any secular trend towards increased participation and must, nevertheless, be taken into account if omitted variable bias is to be avoided.

3 Data Sources and Variable Description

In this paper, the Statistics Canada master data files for the SCF, covering the years 1977 to 1997, and the SLID, covering the years 1998 to 2003, are used. Due to restrictions in the master files of the 1975 SCF, data for that year are not included in our analysis. In addition, data for the years 1976, 1978, 1980 and 1983 are not used either as these were small sample years of the SCF. Thus, 1977 is the starting point of the sample while 2003 is the last available year of the SLID master files.

Our units of analysis are the individuals who reside in economic families - defined as a group of persons residing together and related by blood, marriage or adoption. For the purpose of investigating the possible factors influencing university attendance, we use only the sub-sample of economic families with children between 17 and 24 in the corresponding survey year. We combine information from the individual and family files in order to construct data for individuals, by gender, but for whom important family characteristics (such as income, the number of children in the family and the head's education) are available. For this subset of data, PROBU is used as the dependant variable in both linear probability and logit models. PROBU is a dummy variable that equals 1 if the child aged 17-24 in the economic family attends university; it is equal to 0 otherwise. When different equations are estimated for each gender, PROBU refers specifically to the female and male children in the economic family. Thus, PROBU_f equals 1 for a female child in a family if that child attends university and it equals zero otherwise. Similarly, PROBU_m equals 1 for a male child in a family if that child attends university and it equals zero otherwise.

Our equations condition on the number of children (Children) and its square (Children Squared) in the economic family within which an individual resides. These are all children aged 17-24. This variable may affect the probability of attending university.

Tuition fees (Tuition) represent a major cost component for individuals attending university. This may be particularly so for the children of low-income families operating in the context of liquidity constraints and capital market imperfections. The tuition fee variable for each year is generated by using the tuition fees for arts programs in the largest university of each province. Nominal fees are converted into real terms by deflating with the All Items Consumer Price Index (1992=100) for the largest city in each province. The real tuition fee variable constructed is reported, for each year and province, in Appendix Table A.

Family income (Income) is another potentially important variable. We define family income as the sum of the parents' after-tax income and deflate by the All Items Consumer Price Index (1992=100) for the largest city in the province in which the economic family resides. Since the relationship between postsecondary attendance and family income may well not be linear, we include a quadratic term in real family after-tax income.

When considering the cost of attending university, transportation and rental expenditures are important elements to be taken into account. Living far from a university means that university education may be costlier than, perhaps, when living in a city with a university. To capture these cost dimensions, we use the dummy variable, Urban, to generate a proxy for these cost considerations. The variable Urban is equal to 1 if the economic family lives in an urban area; otherwise it equals 0.

The family head's⁵ level of education is often used to explain the children's participation in postsecondary education. The following dummy variables are used for this purpose: NonGrad equals 1 if the family head has not completed high school; it equals 0 otherwise. This variable represents the omitted category. Grad equals 1 if the family head has completed high school but no further education; it equals 0 otherwise. Somepost equals 1 if the family head has had some post-secondary education but received no certificate, diploma or degree; it equals 0 otherwise. Post equals 1 if the family head attended postsecondary education and received a certificate but no degree; it equals 0 otherwise. Degree equals 1 if the family head has a university degree; it equals 0 otherwise.

When investigating the problem of university attendance for the whole of Canada, it is

⁵ Head refers to the main earner for each family.

natural to take regional aspects into consideration. This is because the incentive to attend postsecondary education is likely to be related to region-specific effects such as differences in provincial student loan programs. Provincial dummy variables are used to capture intercept differences between provinces, with British Columbia as the omitted category.

The University Premium is one potential influence on university enrollments. The calculation of this premium is by no means straight forward (Bar-Or *et al* (1995), Burbridge *et al* (2002), and Robb *et al* (2003)). These studies demonstrate that the university premium calculated from Canadian survey data (the LFS, the SCF, and the SLID) is relatively constant over time if age is used - as earlier US literature has done. In this paper, we follow Bar-Or *et al* (1995) and combine the highest education level each individual achieved with a certain age range as a proxy for experience rather than use age itself as the basis for constructing the university premium. We define the premium as the added earnings that would accrue to someone with five years of experience if they have a university degree as opposed to someone with five years of experience and completed high school only. Thus, for those with a university degree, we select employees aged 24 to 29 and, for those with a high school certificate only, we select employees aged 18 to 23. For each group we calculate the average earnings, on a country-wide basis, by survey year and the university premium is defined as the ratio of these averages. These calculations are done for women and men separately and the gender-specific university premium is assigned to the women and men in our sample. As noted in Table 7, the university premium rises continually but more so for females than for males.⁶

Tuition fees and the university premium have clear time dimensions but may not adequately capture secular forces that operate on the propensity to attend university. For this reason we include a time trend (Trend) with observations for 1977 taking a value of 1, 1979 a value of 3, and so on to 2003.

The Appendix B table gives the number of individuals appearing in our samples by year. Regression results are reported in the following section.

4 Empirical results

⁶ We use full-time full-year paid employees, thus avoiding possible reporting problems involving the self-employed.

To explore the quantitative relationships alluded to above, various models are adopted. The Linear Probability model, estimated using Ordinary Least Squares (OLS) is generally viewed as a benchmark, providing a first look at the relationships involved. In this specific context, PROBU is used as the dependent variable. Other variables mentioned in the previous section are assumed to influence PROBU and are used as the independent variables. They are Tuition, Income, Income Squared, Children, Children Squared, Urban, the head's education dummy variables, the provincial dummy variables, the University Premium and Trend.

Table 8 provides results for the two genders and for the sample pooled across the genders. Coefficients and the ratio of coefficients to estimated standard errors are provided. In addition, asterisks indicate whether the coefficients for each variable are statistically different⁷ in the male and female equations. For all three OLS regression equations, a nonlinear relationship between PROBU and family income can be observed. The coefficient for Income has a significant, positive, value, with estimates (coefficient/standard error) of 1.07E-06 (9.25) and 1.32E-06 (13.04) for females and males respectively. The two coefficients are not statistically different from each other in this case. The coefficients for Income Squared are -4.93E-13 (-5.24) and -1.01E-12 (-13.31) and for females and males respectively. This gives a concave relationship between family income and the probability of attending university for both females and males. The coefficient of Income Squared is statistically different at the 1% level of significance in the two gender-based equations. The number of children also affects the probability of attending university in a concave manner for both genders.

The head's education level plays an important role in determining university participation, as has been determined in many previous studies. Relative to the omitted category of male children whose head of family has not completed high school, a male's probability of attending university will increase by 3.5 percentage points if the family head graduates from a high school. This marginal effect is a little higher in the female regression but the two coefficients are not statistically different from each other. The probability that male or female children will go to university increases as the education level of the head increases. These marginal effects are always higher for female than for male children. The difference between the coefficients for

⁷ This test is carried out in a pooled regression by interacting each variable concerned with a female dummy variable.

the two genders is statistically significant for Somepost, Post, and Degree.

The coefficients on Urban are 0.047 (10.54) and 0.057 (17.78) respectively for female and males. This indicates that children from families living in urban areas are more likely to attend university than those from rural areas. This effect is a little stronger for male children.

The provincial dummy variables show differences in PROBU between each province and British Columbia. For example, the coefficient for Ontario is 0.041 (5.25) for females and 0.037 (5.85) for males. This means that the expected probability of children from Ontario attending university will be about 4 percentage points higher than children from British Columbia.

Tuition does not carry the anticipated negative coefficient in the equations for females or males but these coefficients are not statistically different from zero. Paradoxically, Tuition has a significant, positive, effect in the pooled equation. We note however that, in that equation, Trend does not satisfactorily capture the secular increase in university participation - a job that is apparently and incorrectly done by Tuition.

University Premium has the expected positive, albeit weak, correlations with respect to university participation for both males and females. The marginal effects of University Premium on university attendance are different in value but not statistically different from each other. Trend significantly increases participation in both male and female regressions, though there are some indications that it competes, in a statistical sense, with both Tuition and University Premium for explaining the increase in university participation.

The Blinder-Oaxaca decomposition is a commonly used method for analyzing differences between male and female wages in the labor market and the extent to which observed differences are due to differences in characteristics or 'discrimination'. In this paper, this technique is adapted to see if it can be used to determine which factors have major effects in explaining the university participation gap between the genders. Following Oaxaca and Ransom (1994, 1998) and Neumark (1988) the difference between female and male attendance probabilities can be written as:

$$\bar{P}_f - \bar{P}_m = \bar{X}'_f \hat{\beta}_f - \bar{X}'_m \hat{\beta}_m = (\bar{X}'_f - \bar{X}'_m) \hat{\beta}_p + \bar{X}'_f (\hat{\beta}_f - \hat{\beta}_p) + \bar{X}'_m (\hat{\beta}_p - \hat{\beta}_m) \quad (4.1)$$

\bar{P}_f and \bar{P}_m are the observed and predicted probabilities of female and male participation rates,

i.e. of PROBU_f and PROBU_m respectively. \bar{X}_f and \bar{X}_m are the mean values of the independent variables in the female and male sub-samples. $\hat{\beta}_f$ and $\hat{\beta}_m$ are the vectors of estimated coefficients, in Table 8, for the female and male regressions respectively. $\hat{\beta}_p$ is the vector of coefficients estimated from the pooled regression, also in Table 8. In this decomposition, the first term is defined as the endowment difference. The second term is interpreted as the female advantage (for university attendance) and the third term is interpreted as the male disadvantage. The sum of the second and the third terms is brought about by differences in the coefficients. In the wage literature, it is referred to as ‘discrimination’. In practice, it is hard to interpret this ‘discrimination’ term – see Jones (1983) and Cain (1986). This decomposition is also adopted by Jacob (2002) to study differences in postsecondary participation by gender. An important difference between this paper and that of Jacob (2002) is that we explore dynamic trends over a very long period, rather than differences at a point in time.

Table 9 shows the decomposition results that are implied by the estimates in Table 8. Rows 1 and 2, Table 9, show the average participation rate for the whole period and for selected years - for females and males respectively. Row 3 shows the difference between the female and male averages.⁸ Rows 4 and 5 show (in levels and percentages respectively) the part in row 3 that can be explained by differences in the University Premium and rows 6 and 7 the part that can be explained by all the characteristics, including the University Premium. Rows 8 and 9 show the remainder which includes differences in coefficients, or the sum of terms 2 and 3 in equation (4.1), plus (in the case of specific years only) any year-specific differences in the average values of residuals - see footnote 8. As shown in Table 9, differences in the characteristics of the male and female samples explain most of the differences in row 3. For the entire time period, the difference between female and male participation is 5.57 percentage points. Approximately 3.93 percentage points are explained by the endowment difference between females and males.

⁸ Note that, for the period as a whole, row 3, Table 9, represents both the actual average difference between PROBU_f and PROBU_m and the predicted difference, i.e. the LHS of equation (4.1). This does not hold for each selected year in Table 9. For clarity of presentation, the entries in row 3 for the five selected years include the average error differences for the observations of each of these years and, except for rounding, rows 6 and 8 should add up to row 3.

Only 1.64 percentage points comes from differences in the coefficients. In other words, the observed difference in the average university participation rate between females and males of about 5.57 percentage points is largely (70.62%) explained by differences in the characteristics found in the female and male sample. Among the independent variables, only the University Premium is capable of explaining the difference in characteristics to any great extent. As demonstrated by rows 4 and 5, 83.5% of the difference in enrolments between females and males that is explained by differences in characteristics (i.e., 0.0328 of the 0.0393) is due to the difference in university premium by gender. In fact, the university premium accounts for 58.97% of the overall gender imbalance (i.e., that is due to both differences in characteristics and differences in responses by gender).

The decomposition results for selected years⁹ are also provided in Table 9. At the beginning of the period, the average difference in participation rates between females and males is small but so is the difference in their values of the University Premium. The difference in the average participation rates grows over time as does that in the University Premium and endowment differences continue playing an important role.¹⁰

The finite-sample assumptions entailed in OLS regression and hypothesis test procedures are too strong given that the distribution of the residual term does not follow the normal distribution in this context. One nonlinear alternative is the logit model defined as

$$\Pr(y = 1 | X) = \frac{e^{X\beta}}{1 + e^{X\beta}} \quad (4.2)$$

where the right hand side of the equation is the logistic distribution function and $X\beta$ is called the logit score or index.

Decomposition procedures in the context of the logit model were first proposed by Fairlie (1999) and a discussion of this technique can be found in Fairlie (2006). These decompositions focus on the characteristics or endowment difference, i.e. the first term in equation (4.1). The

⁹ Here, we use the regression results in Table 8. When investigating each particular year, we use the yearly sub-samples for prediction purposes.

¹⁰ Because the estimation is done for the period as a whole, it is possible for somewhat unusual decompositions to appear in certain years. Thus 1977 is a year when characteristics would account for a greater imbalance than was actually observed, while 2000 is a year when the opposite is true.

contribution of an independent variable X_1 to the gender gap can be expressed as

$$\hat{D}_1 = \frac{1}{N} \sum_{i=1}^N \left[F(\hat{\beta}_0^* + X_{1i}^f \hat{\beta}_1^* + X_{2i}^f \hat{\beta}_2^* + X_{3i}^f \hat{\beta}_3^* + \dots) - F(\hat{\beta}_0^* + X_{1i}^m \hat{\beta}_1^* + X_{2i}^f \hat{\beta}_2^* + X_{3i}^f \hat{\beta}_3^* + \dots) \right] \quad (4.3)$$

The contribution of X_2 to the gender gap is

$$\hat{D}_2 = \frac{1}{N} \sum_{i=1}^N \left[F(\hat{\beta}_0^* + X_{1i}^m \hat{\beta}_1^* + X_{2i}^f \hat{\beta}_2^* + X_{3i}^f \hat{\beta}_3^* + \dots) - F(\hat{\beta}_0^* + X_{1i}^m \hat{\beta}_1^* + X_{2i}^m \hat{\beta}_2^* + X_{3i}^f \hat{\beta}_3^* + \dots) \right] \quad (4.4)$$

This process goes on until all observation values of male variables are substituted with female observation values. Here N denotes the number of observations. $\hat{\beta}^*$ is the vector of coefficients estimated using pooled sample of male and female observations¹¹. This equation holds for the logistic distribution in (4.2). In reality, it is unlikely that the number of observations N is the same for the male and female sub-samples. Some observations must be dropped from the larger sub-sample so as to keep the same number of observations for the above switching process. In order to avoid biased estimation, a simulation process is suggested by Fairlie (1999, 2006). In this paper, the following simulation process has been done:

- (1) Estimate a logit model for the pooled sample.
- (2) Predict the probability of participation, using results from above step, for each individual in both the male and female sub-samples.
- (3) The number of observations for males exceeds that for females. Randomly draw samples from the male sub-sample that have the same number of observations as in the female sub-sample.
- (4) Sort the male and female data by the predicted probabilities.
- (5) Do the switching process variable by variable as described in (4.3) and (4.4).
- (6) Repeat steps (3) and (5) 1000 times. Use the average decomposition result, as the final decomposition output.

The switching process described in (4.3) and (4.4) is switching from female to male

¹¹ According to Fairlie (1999, 2006), a gender dummy variable (e.g. female) should be included in the pooled regression but its coefficient should not be used in the decompositions. However, by including a female dummy into the pooled regression, we introduce a discrimination term in the regression equation which may lead to an inaccurate estimation of the no-discrimination scenario. By including a female dummy, the contribution of the University Premium may be underestimated in the decomposition process. In our study, no female dummy is added in the pooled regression.

observations. It is also possible to do the reverse and we will report results by using both switching processes.

Another problem is that, when using the survey data, generally the sample weights should be considered. When we do the switching process, we need to decide which weight, the weight with respect to male or female observations, should be used. We report results using both sets of weights.

Standard errors can be calculated in each iteration as

$$Var(\hat{D}_j) = \left(\frac{\partial \hat{D}_j}{\partial \hat{\beta}^*} \right) Var(\hat{\beta}^*) \left(\frac{\partial \hat{D}_j}{\partial \hat{\beta}^*} \right) \quad (4.5)$$

where \hat{D}_j is the contribution of the j th variable to the gender gap. For example, if $j = 1$,

$$\frac{\partial \hat{D}_1}{\partial \hat{\beta}^*} = \frac{1}{N} \sum_{i=1}^{N_B} f(X_i^{ff} \hat{\beta}^*) X_i^{ff} - f(X_i^{mf} \hat{\beta}^*) X_i^{mf} \quad (4.6)$$

and f is the logistic probability density function. Logit regression output is presented in Table 10. Generally, we have similar results for the logit and Linear Probability models. We will not discuss the logit output in detail, but will focus on the Fairlie decomposition results using the logit regression coefficients. Table 11 reports decomposition results for the whole period under investigation. The switching process in Table 11 is from female to male observations. Column 1, Tables 11 and 12, presents results using female weights in the simulation. Columns 2 and 3, Tables 11 and 12, present results using male weights and no weights, respectively.¹² Column 1, Table 11, shows that 71.79% of the difference between female and male participation in university is due to differences in characteristics. Of these characteristics, the difference due to the University Premium is 68.16%, which accounts for most of the difference due to characteristics. The percentage change due to Tuition and Income plus Income Squared is 1.27% and 2.93% respectively for the whole period. Although the marginal effects for Tuition and Income are different in the male and female regressions, they do not matter a lot in explaining the gender gap because these variables are unrelated to gender. Using the male weights, column 2 Table 11, shows a similar total percentage change brought about by differences in characteristics. The University Premium contribution

¹² Note that, when no weights are used, the logit results are re-estimated without weighting the individual observations.

decreases to 62.32%. The contributions brought about by Tuition and Income change as well but their influence is still limited. Thus changing the weights preserves the pattern of results obtained earlier. Similarly, using no weights, as in column 3, Table 11, also preserves the pattern of results in column 1, Table 11. The University Premium still plays the most important role in explaining the participation gap (75.28%). Table 12 gives results based on switching from male to female observations. It is obvious that the same patterns are observed.

In addition to studying decompositions for the whole period, we also check selected years as we did in the OLS decompositions. Again, the caveat that the logit results are estimated for the whole period but applied to sub-samples applies. Again, it follows that selected years might display unusual patterns. Tables 13 and 14 present these results, with Table 13 switching from female to male and Table 14 from male to female observations. Since other variables continue to have a limited influence on the gender gap, we only report the percentage change brought about by the University Premium and the characteristics in their entirety. Generally, for each year, characteristic differences account for most of the gender gap and the University Premium is the main factor involved. The unusual patterns, observed in the OLS results for 1977 and 2000, appear in the logit-based decompositions as well.

5 Conclusion

Females now dominate university enrolment. We used the master files of SCF (1977-1997) and SLID (1998-2003) to investigate the possible forces that shape the increasing university participation imbalance between the genders in Canada. By adopting linear and nonlinear decomposition techniques, the additional earnings accruing to holders of university degrees relative to those accruing to individuals with only high school emerge as the main factor influencing the gender imbalance noted above. Using the master files, it is possible to distinguish males from females and university attendance from college; this is not possible when public use files are used.

From the point of view of policy implications, our results suggest that the increasing gender imbalance in university attendance reflects, to a large extent, the difference in the returns to a university education for the different genders. As the relative supply of highly educated women rises relative to that of males, a natural equilibrating process may occur, at least to some extent. Moreover, as noted by Shannon and Kidd (2001), the higher rate of

university participation of women may help redress the imbalance in male-female earnings, although they project it will not completely eliminate the earnings gap over the next three decades. It may be worthwhile trying to determine if financial support (e.g., through student loans) affects males differently than females as a means for at least partially redressing this imbalance.

Others have suggested possible problems arising from this gap, such as the difficulty that highly educated women will have in marrying men of equally high education levels (e.g., see Evers, Livernois, and Mancuso (2004)). However, it is not clear that there is any role for policy in removing this cause of the imbalance (i.e., the higher returns for women) or to subsidize more highly the cost of education for males.

Table 1
The Proportion of Female and Male Children at University and College
(1977-2003)

| Year | Females at University | Males at University | Females at College | Males at College |
|------|-----------------------|---------------------|--------------------|------------------|
| 1977 | 0.12 | 0.11 | 0.10 | 0.09 |
| 1985 | 0.17 | 0.13 | 0.14 | 0.11 |
| 1993 | 0.23 | 0.17 | 0.17 | 0.14 |
| 2000 | 0.29 | 0.19 | 0.22 | 0.20 |
| 2003 | 0.31 | 0.20 | 0.20 | 0.20 |

Source: SCF and SLID, various years. A number such as 0.12 for Females at University in 1977 indicates that of all female children in families with children aged (17-24) the proportion of female children attending university was on average equal to 0.12.

Figure 1
Females and Males at University and College

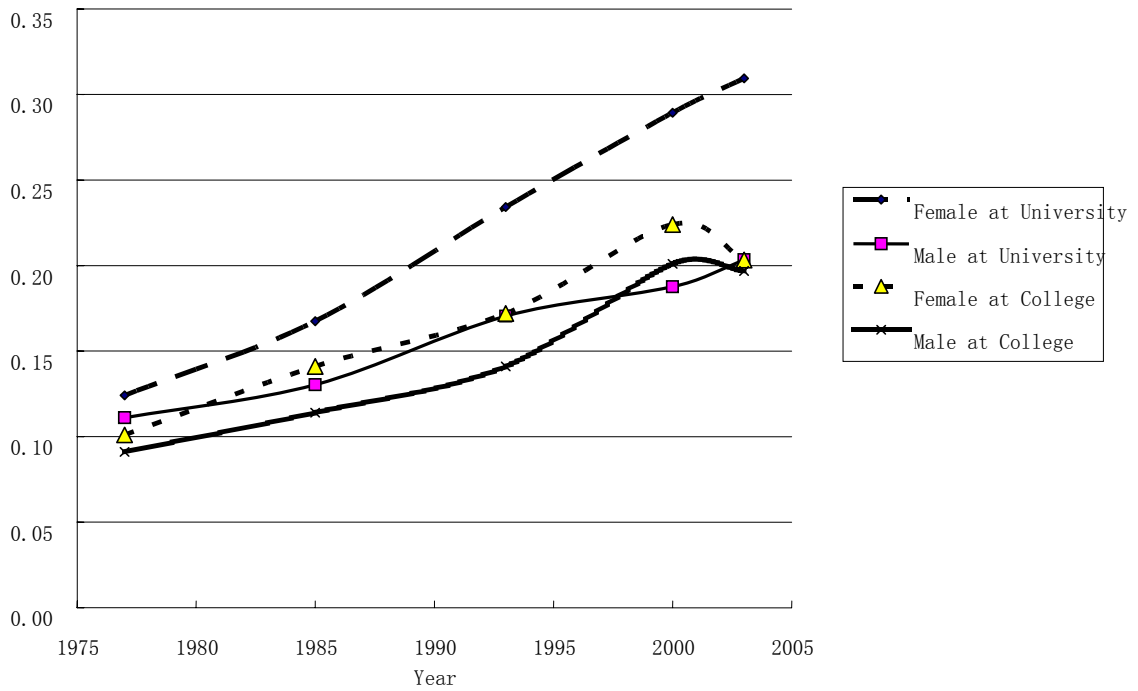


Table 2
Proportion of Female Children Between 17-24 at University by Income Quintile

| Family Income Quintiles | | | | | | |
|-------------------------|-------|--------|-------|--------|-------|--|
| Year | First | Second | Third | Fourth | Fifth | |
| 1977 | 0.06 | 0.07 | 0.13 | 0.15 | 0.23 | |
| 1985 | 0.11 | 0.12 | 0.13 | 0.19 | 0.30 | |
| 1993 | 0.20 | 0.18 | 0.24 | 0.23 | 0.35 | |
| 2000 | 0.27 | 0.25 | 0.23 | 0.32 | 0.41 | |
| 2003 | 0.25 | 0.24 | 0.29 | 0.39 | 0.40 | |

Source: SCF and SLID, various years. A number such as 0.06 for the first quintile in 1977 indicates that the proportion of female children attending university was on average equal to 0.06.

Table 3
Proportion of Male Children Between 17-24 at University by Income Quintile

| Family Income Quintiles | | | | | | |
|-------------------------|-------|--------|-------|--------|-------|--|
| Year | First | Second | Third | Fourth | Fifth | |
| 1977 | 0.06 | 0.08 | 0.11 | 0.13 | 0.21 | |
| 1985 | 0.08 | 0.10 | 0.11 | 0.14 | 0.25 | |
| 1993 | 0.11 | 0.11 | 0.20 | 0.20 | 0.26 | |
| 2000 | 0.14 | 0.16 | 0.19 | 0.19 | 0.30 | |
| 2003 | 0.14 | 0.17 | 0.17 | 0.22 | 0.36 | |

Source: SCF and SLID, various years. A number such as 0.06 for the first quintile in 1977 indicates that the proportion of male children attending university was on average equal to 0.06.

Table 4
The Relative Likelihood of University Education

| Fifth Quintile Relative to First Quintile | | |
|-------------------------------------------|----------------------|--------------------|
| Year | Female at University | Male at University |
| 1977 | 3.65 | 3.39 |
| 1985 | 2.61 | 3.16 |
| 1993 | 1.76 | 2.39 |
| 2000 | 1.54 | 2.16 |
| 2003 | 1.62 | 2.66 |

Source: SCF and SLID, various years.

Table 5
Proportion of Female Children Between 17-24 at University by Income Group
(1992 Constant Dollars)

| Income Range (\$) | Year | | | | |
|----------------------|------|------|------|------|------|
| | 1977 | 1985 | 1993 | 2000 | 2003 |
| 0-20,000 | 0.06 | 0.13 | 0.24 | 0.28 | 0.24 |
| 20,001-30,000 | 0.07 | 0.09 | 0.16 | 0.24 | 0.24 |
| 30,001-40,000 | 0.09 | 0.13 | 0.20 | 0.28 | 0.26 |
| 40,001-50,000 | 0.13 | 0.14 | 0.23 | 0.24 | 0.25 |
| 50,001-60,000 | 0.16 | 0.21 | 0.23 | 0.27 | 0.35 |
| 60,001-70,000 | 0.21 | 0.23 | 0.32 | 0.33 | 0.36 |
| 70,001-80,000 | 0.14 | 0.30 | 0.40 | 0.35 | 0.40 |
| 80,000+ | 0.20 | 0.22 | 0.22 | 0.33 | 0.36 |

Source: SCF and SLID, various years.

Table 6
Proportion of Male Children Between 17-24 at University by Income Group
(1992 constant dollars)

| Income Range (\$) | Year | | | | |
|----------------------|------|------|------|------|------|
| | 1977 | 1985 | 1993 | 2000 | 2003 |
| 0-20,000 | 0.05 | 0.07 | 0.09 | 0.13 | 0.17 |
| 20,001-30,000 | 0.07 | 0.09 | 0.13 | 0.14 | 0.10 |
| 30,001-40,000 | 0.09 | 0.11 | 0.13 | 0.18 | 0.18 |
| 40,001-50,000 | 0.12 | 0.12 | 0.20 | 0.19 | 0.17 |
| 50,001-60,000 | 0.12 | 0.13 | 0.22 | 0.15 | 0.18 |
| 60,001-70,000 | 0.15 | 0.19 | 0.18 | 0.21 | 0.21 |
| 70,001-80,000 | 0.25 | 0.24 | 0.28 | 0.25 | 0.30 |
| 80,000+ | 0.15 | 0.18 | 0.18 | 0.23 | 0.28 |

Source: SCF and SLID, various years.

Table 7
University Premium in Canada (1977-2003)

| Year | Female | Male | Overall | Ratio of Female to Male |
|-------------|---------------|-------------|----------------|--------------------------------|
| 1977 | 1.88 | 1.63 | 1.76 | 1.15 |
| 1979 | 1.82 | 1.56 | 1.68 | 1.17 |
| 1981 | 1.78 | 1.59 | 1.69 | 1.12 |
| 1982 | 1.94 | 1.64 | 1.78 | 1.18 |
| 1984 | 2.13 | 1.84 | 1.96 | 1.16 |
| 1985 | 2.18 | 1.86 | 1.95 | 1.17 |
| 1986 | 2.09 | 1.91 | 1.99 | 1.09 |
| 1987 | 2.11 | 1.78 | 1.90 | 1.19 |
| 1988 | 2.12 | 1.65 | 1.80 | 1.28 |
| 1989 | 2.27 | 1.87 | 1.99 | 1.21 |
| 1990 | 2.27 | 1.98 | 2.08 | 1.15 |
| 1991 | 2.52 | 2.28 | 2.33 | 1.11 |
| 1992 | 2.50 | 2.30 | 2.34 | 1.09 |
| 1993 | 2.79 | 2.27 | 2.41 | 1.23 |
| 1994 | 2.80 | 2.08 | 2.30 | 1.35 |
| 1995 | 2.60 | 2.05 | 2.19 | 1.27 |
| 1996 | 2.66 | 2.17 | 2.27 | 1.23 |
| 1997 | 2.63 | 2.14 | 2.20 | 1.23 |
| 1998 | 2.50 | 1.99 | 2.05 | 1.26 |
| 1999 | 2.40 | 2.00 | 2.03 | 1.20 |
| 2000 | 2.35 | 2.22 | 2.16 | 1.06 |
| 2001 | 2.48 | 2.08 | 2.12 | 1.19 |
| 2002 | 2.30 | 2.02 | 2.07 | 1.14 |
| 2003 | 2.73 | 2.13 | 2.16 | 1.28 |

Source: SCF and SLID, various years.

Table 8
OLS Results: Determinants of Children Attending University by Gender (1977-2003)

| Variable | Female | | Male | | Pooled | |
|--------------------------------|-------------|----------|-------------|----------|-------------|----------|
| | Coefficient | Coef/s.e | Coefficient | Coef/s.e | Coefficient | Coef/s.e |
| Tuition | 1.22E-06 | 0.19 | 4.31E-06 | 0.78 | 0.0000155 | 3.74 |
| Income | 1.07E-06 | 9.25 | 1.32E-06 | 13.04 | 1.22E-06 | 14.95 |
| Income2*** | -4.93E-13 | -5.24 | -1.01E-12 | -13.31 | -7.69E-13 | -4.72 |
| Children* | 0.0902709 | 9.18 | 0.0693222 | 8.87 | 0.078326 | 12.71 |
| Children2 | -0.0144855 | -6.64 | -0.0119993 | -6.98 | -0.0129324 | -9.50 |
| Urban* | 0.0467273 | 10.54 | 0.0571343 | 17.78 | 0.0519175 | 19.59 |
| Head Education | | | | | | |
| Grad | 0.0377445 | 6.98 | 0.0345493 | 8.09 | 0.0381086 | 11.33 |
| Some Postsecondary*** | 0.0653069 | 6.84 | 0.0376732 | 4.89 | 0.0509854 | 8.45 |
| Postsecondary*** | 0.0635225 | 10.08 | 0.0389547 | 7.66 | 0.0496359 | 12.45 |
| Degree*** | 0.2217073 | 25.73 | 0.1898254 | 25.61 | 0.2047287 | 36.33 |
| Province | | | | | | |
| Newfoundland*** | 0.1066316 | 11.07 | 0.0657441 | 8.77 | 0.0832378 | 13.86 |
| Prince Edward Island*** | 0.1317693 | 11.01 | 0.0963969 | 10.18 | 0.105676 | 14.07 |
| Nova Scotia*** | 0.0923607 | 8.86 | 0.0617473 | 7.38 | 0.0660543 | 10.03 |
| New Brunswick*** | 0.1127086 | 11.65 | 0.085154 | 11.06 | 0.0906498 | 14.88 |
| Quebec | 0.0448822 | 5.04 | 0.0315614 | 4.46 | 0.0423498 | 7.60 |
| Ontario | 0.0409847 | 5.25 | 0.0373784 | 5.85 | 0.0344802 | 6.91 |
| Manitoba | 0.0813638 | 8.07 | 0.0761665 | 9.43 | 0.0792982 | 12.49 |
| Saskatchewan | 0.0682947 | 7.17 | 0.0775717 | 10.26 | 0.0710274 | 11.91 |
| Alberta | 0.016081 | 1.76 | 0.0173743 | 2.4 | 0.0162999 | 2.84 |
| University Premium | 0.0051204 | 0.38 | 0.0232956 | 1.67 | 0.0894269 | 14.54 |
| Time Trend*** | 0.0055758 | 6.92 | 0.0016684 | 2.64 | 0.0004215 | 1.03 |
| Constant | -0.18591 | -6.25 | -0.1870745 | -7.24 | -0.322711 | -23.22 |

Note: *, ** and *** Indicate that the coefficient from two regressions are different at 10% 5% and 1% level of significance respectively.

Table 9
Blinder-Oaxaca Decomposition Results

| | 1977-2003 | 1977 | 1985 | 1993 | 2000 | 2003 |
|-------------------------------------------------|------------------|----------------|---------------|---------------|---------------|---------------|
| Female Participation Rate | 0.2073 | 0.1241 | 0.1675 | 0.2342 | 0.2893 | 0.3094 |
| Male Participation Rate | 0.1516 | 0.1111 | 0.1304 | 0.1704 | 0.1876 | 0.2034 |
| Imbalance | 0.0557 | 0.0130 | 0.0371 | 0.0638 | 0.1017 | 0.1060 |
| Difference Due to University Premium | 0.0328 | 0.0224 | 0.0286 | 0.0465 | 0.0116 | 0.0537 |
| Percentage Due to University Premium | 58.97% | 172.00% | 77.13% | 72.92% | 11.44% | 50.60% |
| Difference Due to Characteristics | 0.0393 | 0.0320 | 0.0324 | 0.0478 | 0.0098 | 0.0603 |
| Percentage Due to Characteristics | 70.62% | 246.39% | 87.34% | 75.00% | 9.67% | 56.89% |
| Unexplained Difference | 0.0164 | -0.0190 | 0.0047 | 0.0159 | 0.0918 | 0.0457 |
| Percentage Due to Unexplained Difference | 29.38% | -146.39% | 12.66% | 25.00% | 90.33% | 43.11% |

Table 10:
Logit Results: Determinants of Children Attending University by Gender (1977-2003)

| Variable | Female | | | Male | | | Pooled | | |
|-----------------------------|-------------|-----------|-----------------|-------------|-----------|-----------------|-------------|-----------|-----------------|
| | Coefficient | Coef/s.e. | Marginal Effect | Coefficient | Coef/s.e. | Marginal Effect | Coefficient | Coef/s.e. | Marginal Effect |
| Tuition | -0.0000573 | -1.25 | -8.77E-06 | 8.45E-06 | 0.18 | 9.75E-07 | 0.0000735 | 2.29 | 9.74E-06 |
| Income | 5.97E-06 | 8.99 | 9.14E-07 | 0.0000102 | 8.62 | 1.18E-06 | 7.30E-06 | 14.68 | 9.67E-07 |
| Income2 | -3.16E-12 | -4.37 | -4.84E-13 | -1.51E-11 | -3 | -1.74E-12 | -4.94E-12 | -5.23 | -6.54E-13 |
| Children | 0.6321668 | 7.91 | 0.0968208 | 0.6423005 | 7.74 | 0.0740706 | 0.6308232 | 11.03 | 0.0835404 |
| Children2 | -0.1061862 | -5.55 | -0.0162632 | -0.1179269 | -5.88 | -0.0135994 | -0.1096763 | -7.98 | -0.0145245 |
| Urban | 0.3471099 | 10.33 | 0.02882575 | 0.5907031 | 16.53 | 0.03272887 | 0.4602717 | 18.9 | 0.03118675 |
| Head Education | | | | | | | | | |
| Grad | 0.3106929 | 6.99 | 0.02540755 | 0.3907817 | 8.58 | 0.01970743 | 0.3693946 | 11.65 | 0.02402999 |
| Some Postsecondary | 0.5016144 | 7.89 | 0.04445637 | 0.4261633 | 6.24 | 0.02185148 | 0.4763069 | 10.28 | 0.03250614 |
| Postsecondary | 0.4884443 | 10.86 | 0.04305059 | 0.4371808 | 8.98 | 0.02253269 | 0.467474 | 14.22 | 0.03177722 |
| Degree | 1.255593 | 25.76 | 0.15058802 | 1.283869 | 25.58 | 0.09854096 | 1.279077 | 36.87 | 0.12422507 |
| Province | | | | | | | | | |
| Newfoundland | 0.6963452 | 10.85 | 0.06692784 | 0.5401623 | 7.92 | 0.02922324 | 0.6083245 | 13.06 | 0.04404634 |
| Prince Edward Island | 0.8844609 | 11.57 | 0.09179542 | 0.8433178 | 10.57 | 0.05265387 | 0.8065631 | 14.75 | 0.06380065 |
| Nova Scotia | 0.6523124 | 8.96 | 0.06156371 | 0.5379316 | 7.18 | 0.02907196 | 0.5124269 | 9.95 | 0.0355422 |
| New Brunswick | 0.7611797 | 11.57 | 0.07513713 | 0.7215703 | 10.73 | 0.04253119 | 0.6807969 | 14.64 | 0.05091781 |
| Quebec | 0.2638674 | 4.24 | 0.02115521 | 0.2371962 | 3.65 | 0.01113446 | 0.2844452 | 6.33 | 0.01781333 |
| Ontario | 0.3024906 | 5.35 | 0.02465117 | 0.3284062 | 5.67 | 0.01608531 | 0.2761588 | 6.88 | 0.01723043 |
| Manitoba | 0.5168873 | 7.82 | 0.04610421 | 0.6106642 | 9.12 | 0.03415533 | 0.5644573 | 12.01 | 0.04007487 |
| Saskatchewan | 0.4646156 | 7.08 | 0.04054257 | 0.6399931 | 9.89 | 0.03629528 | 0.5263229 | 11.46 | 0.03673418 |
| Alberta | 0.1211465 | 1.87 | 0.00914341 | 0.1417626 | 2.16 | 0.00636696 | 0.119585 | 2.6 | 0.00695816 |

Table 10:
Logit Results: Determinants of Children Attending University by Gender (1977-2003)

| Variable | Female | | | Male | | | Pooled | | |
|-----------------------|-------------|------------|-----------------|-------------|------------|-----------------|-------------|------------|-----------------|
| | Coefficient | Coef/s.e. | Marginal Effect | Coefficient | Coef/s.e. | Marginal Effect | Coefficient | Coef/s.e. | Marginal Effect |
| University Premium | 0.0603982 | 0.72 | 0.0092504 | 0.2074248 | 1.81 | 0.0239204 | 0.6360689 | 15.01 | 0.0842351 |
| Time Trend | 0.0420051 | 7.45 | 0.0064334 | 0.0161076 | 2.81 | 0.0018575 | 0.0078856 | 2.31 | 0.0010443 |
| Constant | -4.091806 | -21.02 | | -4.809422 | -21.4 | | -5.359417 | -49.75 | |
| Log Likelihood | | -31367.883 | | | -32816.216 | | | -64419.134 | |

Table 11
Fairlie's Decomposition For Logit regressions
(Switching from Female to Male Observations)

| | (1) | (2) | (3) |
|----------------------------------------------------------------------|---------------|---------------|-------------------|
| Weights Used for simulation | Female | Male | Non_weight |
| Female's Participation Rate | 0.2073 | 0.2073 | 0.1877 |
| Male's Participation Rate | 0.1516 | 0.1516 | 0.1304 |
| Total Gap (Real) | 0.0557 | 0.0557 | 0.0573 |
| Difference by Changing Tuition Fee | 0.0007 | 0.0002 | 0.0006 |
| Percentage Change Brought by Tuition Fee | 1.27% | 0.43% | 0.96% |
| Standard Error | 9.45E-06 | 2.14E-06 | 0.000114125 |
| Difference by Changing Income Level | 0.0016 | -0.0018 | -0.0005 |
| Percentage Change Brought by Income | 2.93% | -3.27% | -0.9% |
| Standard Error | 4.61E-06 | 4.70E-06 | 0.000078247 |
| Difference by Changing Premium | 0.0379 | 0.0347 | 0.0431 |
| Percentage Change Brought by Premium | 68.16% | 62.32% | 75.28% |
| Standard Error | 0.000092906 | 8.555E-05 | 0.0014979 |
| Total Percentage Change Brought by Characteristics Difference | 71.79% | 71.96% | 79.36% |

Table 12
Fairlie's Decomposition For Logit regressions
(Switching from Male to Female Observations)

| | (1) | (2) | (3) |
|----------------------------------------------------------------------|---------------|---------------|-------------------|
| Weights Used for simulation | Female | Male | Non_weight |
| Female's Participation Rate | 0.2073 | 0.2073 | 0.1877 |
| Male's Participation Rate | 0.1516 | 0.1516 | 0.1304 |
| Total Gap (Real) | 0.0557 | 0.0557 | 0.0573 |
| Difference by Changing Tuition Fee | 0.0010 | 0.0006 | 0.0008 |
| Percentage Change Brought by Tuition Fee | 1.72% | 1.00% | 1.46% |
| Standard Error | 0.000018555 | 1.184E-05 | 0.000291104 |
| Difference by Changing Income Level | 0.0037 | 0.0006 | 0.0033 |
| Percentage Change Brought by Income | 6.72% | 1.06% | 0.0571547 |
| Standard Error | 8.80E-06 | 2.74E-06 | 0.000131342 |
| Difference by Changing Premium | 0.0329 | 0.0305 | 0.0368 |
| Percentage Change Brought by Premium | 59.05% | 54.75% | 64.33% |
| Standard Error | 0.000091728 | 8.392E-05 | 0.0015145 |
| Total Percentage Change Brought by Characteristics Difference | 71.79% | 71.96% | 79.36% |

Table 13
Contribution from University Premium for Particular Years
(Switching from Female to Male Observations)

| | (1) | (2) | (3) |
|---------------------------------------------------------------|----------------|----------------|----------------|
| Weights Used for simulation | Female | Male | Non_weight |
| 1977 | | | |
| Female's Participation Rate | 0.1241 | 0.1241 | 0.1169 |
| Male's Participation Rate | 0.1111 | 0.1111 | 0.0961 |
| Total Gap (Real) | 0.0130 | 0.0130 | 0.0209 |
| Difference by Changing Premium | 0.0151 | 0.0152 | 0.0168 |
| Percentage Change Brought by Premium | 116.10% | 116.66% | 80.51% |
| Standard Error | 0.00004282 | 0.000043127 | 0.000722207 |
| Total Percentage Change Brought by Characteristics Difference | 185.25% | 183.80% | 122.15% |
| 1985 | | | |
| Female's Participation Rate | 0.1675 | 0.1675 | 0.1638 |
| Male's Participation Rate | 0.1304 | 0.1304 | 0.1180 |
| Total Gap (Real) | 0.0371 | 0.0371 | 0.0458 |
| Difference by Changing Premium | 0.0238 | 0.0241 | 0.0286 |
| Percentage Change Brought by Premium | 64.28% | 65.08% | 62.53% |
| Standard Error | 0.000062434 | 0.000063035 | 0.0010835 |
| Total Percentage Change Brought by Characteristics Difference | 82.99% | 83.83% | 75.47% |
| 1993 | | | |
| Female's Participation Rate | 0.2342 | 0.2342 | 0.2231 |
| Male's Participation Rate | 0.1704 | 0.1704 | 0.1635 |
| Total Gap (Real) | 0.0638 | 0.0638 | 0.0597 |
| Difference by Changing Premium | 0.0514 | 0.0518 | 0.0639 |
| Percentage Change Brought by Premium | 80.61% | 81.27% | 107.07% |
| Standard Error | 0.000144341 | 0.000144996 | 0.0026364 |
| Total Percentage Change Brought by Characteristics Difference | 87.78% | 88.39% | 118.37% |
| 2000 | | | |
| Female's Participation Rate | 0.2893 | 0.2893 | 0.2736 |
| Male's Participation Rate | 0.1876 | 0.1876 | 0.1725 |
| Total Gap (Real) | 0.1017 | 0.1017 | 0.1011 |
| Difference by Changing Premium | 0.0135 | 0.0134 | 0.0168 |
| Percentage Change Brought by Premium | 13.26% | 13.18% | 16.61% |
| Standard Error | 0.000034196 | 0.00003392 | 0.000605719 |
| Total Percentage Change Brought by Characteristics Difference | 9.21% | 9.20% | 12.78% |
| 2003 | | | |
| Female's Participation Rate | 0.3094 | 0.3094 | 0.2970 |
| Male's Participation Rate | 0.2034 | 0.2034 | 0.1828 |
| Total Gap (Real) | 0.1060 | 0.1060 | 0.1142 |
| Difference by Changing Premium | 0.0651 | 0.0652 | 0.0837 |
| Percentage Change Brought by Premium | 61.36% | 61.47% | 73.29% |
| Standard Error | 0.000166316 | 0.000166246 | 0.003043 |
| Total Percentage Change Brought by Characteristics Difference | 71.00% | 71.13% | 80.55% |

Table 14
Contribution from University Premium for Particular Years
(Switching from Male to Female Observations)

| | (1) | (2) | (3) |
|----------------------------------------------------------------------|----------------|----------------|----------------|
| Weights Used for simulation | Female | Male | Non_weight |
| 1977 | | | |
| Female's Participation Rate | 0.1241 | 0.1241 | 0.1169 |
| Male's Participation Rate | 0.1111 | 0.1111 | 0.0961 |
| Total Gap (Real) | 0.0130 | 0.0130 | 0.0209 |
| Difference by Changing Premium | 0.0160 | 0.0160 | 0.0179 |
| Percentage Change Brought by Premium | 122.84% | 123.17% | 86.00% |
| Standard Error | 0.000045214 | 0.000045068 | 0.000765447 |
| Total Percentage Change Brought by Characteristics Difference | 185.25% | 183.80% | 122.15% |
| 1985 | | | |
| Female's Participation Rate | 0.1675 | 0.1675 | 0.1638 |
| Male's Participation Rate | 0.1304 | 0.1304 | 0.1180 |
| Total Gap (Real) | 0.0371 | 0.0371 | 0.0458 |
| Difference by Changing Premium | 0.0246 | 0.0249 | 0.0296 |
| Percentage Change Brought by Premium | 66.36% | 67.19% | 64.53% |
| Standard Error | 0.000064233 | 0.000065136 | 0.0011175 |
| Total Percentage Change Brought by Characteristics Difference | 82.99% | 83.83% | 75.47% |
| 1993 | | | |
| Female's Participation Rate | 0.2342 | 0.2342 | 0.2231 |
| Male's Participation Rate | 0.1704 | 0.1704 | 0.1635 |
| Total Gap (Real) | 0.0638 | 0.0638 | 0.0597 |
| Difference by Changing Premium | 0.0522 | 0.0526 | 0.0653 |
| Percentage Change Brought by Premium | 81.86% | 82.52% | 109.46% |
| Standard Error | 0.00014598 | 0.000147466 | 0.002687 |
| Total Percentage Change Brought by Characteristics Difference | 87.78% | 88.39% | 118.37% |
| 2000 | | | |
| Female's Participation Rate | 0.2893 | 0.2893 | 0.2736 |
| Male's Participation Rate | 0.1876 | 0.1876 | 0.1725 |
| Total Gap (Real) | 0.1017 | 0.1017 | 0.1011 |
| Difference by Changing Premium | 0.0134 | 0.0133 | 0.0167 |
| Percentage Change Brought by Premium | 13.16% | 13.08% | 16.52% |
| Standard Error | 0.000033879 | 0.000033737 | 0.000602754 |
| Total Percentage Change Brought by Characteristics Difference | 9.21% | 9.20% | 12.78% |
| 2003 | | | |
| Female's Participation Rate | 0.3094 | 0.3094 | 0.2970 |
| Male's Participation Rate | 0.2034 | 0.2034 | 0.1828 |
| Total Gap (Real) | 0.1060 | 0.1060 | 0.1142 |
| Difference by Changing Premium | 0.0664 | 0.0652 | 0.0850 |
| Percentage Change Brought by Premium | 62.57% | 61.47% | 74.42% |
| Standard Error | 0.000169142 | 0.000166246 | 0.0030886 |
| Total Percentage Change Brought by Characteristics Difference | 71.00% | 51.81% | 80.55% |

Appendix A
Real Tuition Fees for Full-time Students at Canadian Universities

| | Memorial | U of PEI | Dalhousie | U of NB | U of Quebec | U of T | U of Man. | U of Sask | U of Alberta | UBC |
|------|----------|----------|-----------|---------|-------------|--------|-----------|-----------|--------------|------|
| Year | NF | PEI | NS | NB | QC | ON | MB | SK | AB | BC |
| 1975 | 1401 | 1657 | 1915 | 1632 | 1475 | 1784 | 1197 | 1278 | 1127 | 1202 |
| 1977 | 1208 | 1517 | 1739 | 1800 | 1276 | 1474 | 1082 | 1229 | 1193 | 1024 |
| 1979 | 1283 | 1515 | 1574 | 1526 | 1078 | 1515 | 1095 | 1260 | 1107 | 1103 |
| 1981 | 1013 | 1393 | 1520 | 1410 | 868 | 1457 | 1022 | 1127 | 982 | 972 |
| 1982 | 1009 | 1397 | 1555 | 1439 | 779 | 1434 | 1023 | 1109 | 889 | 984 |
| 1984 | 1169 | 1611 | 1801 | 1687 | 708 | 1561 | 974 | 1184 | 1039 | 1223 |
| 1985 | 1177 | 1645 | 1841 | 1716 | 678 | 1576 | 1029 | 1235 | 1084 | 1672 |
| 1986 | 1228 | 1713 | 1851 | 1752 | 647 | 1576 | 1043 | 1282 | 1078 | 1787 |
| 1987 | 1254 | 1814 | 1860 | 1911 | 619 | 1554 | 1082 | 1294 | 1067 | 2017 |
| 1988 | 1285 | 1844 | 1863 | 1966 | 596 | 1579 | 1140 | 1364 | 1142 | 1812 |
| 1989 | 1303 | 1868 | 1852 | 1990 | 571 | 1551 | 1350 | 1417 | 1127 | 1830 |
| 1990 | 1373 | 1863 | 1827 | 2012 | 547 | 1597 | 1422 | 1425 | 1149 | 1913 |
| 1991 | 1358 | 1855 | 1786 | 1989 | 866 | 1655 | 1489 | 1490 | 1252 | 1903 |
| 1992 | 1544 | 2120 | 2195 | 2100 | 1320 | 1770 | 1756 | 1830 | 1413 | 2046 |
| 1993 | 1672 | 2237 | 2391 | 2318 | 1396 | 1864 | 2001 | 2416 | 1597 | 1975 |
| 1994 | 1942 | 2448 | 2600 | 2426 | 1530 | 1991 | 2071 | 2182 | 1990 | 1930 |
| 1995 | 2059 | 2536 | 2824 | 2389 | 1637 | 2138 | 2116 | 2280 | 2181 | 2027 |
| 1996 | 2181 | 2683 | 2945 | 2488 | 1610 | 2312 | 2162 | 2350 | 2368 | 2102 |
| 1997 | 2470 | 2744 | 3170 | 2662 | 1589 | 2726 | 2241 | 2434 | 2566 | 2090 |
| 1998 | 2903 | 2966 | 3387 | 2929 | 2127 | 2932 | 2278 | 2544 | 2788 | 2113 |
| 1999 | 2858 | 3082 | 3978 | 3018 | 2232 | 3162 | 2330 | 3003 | 2966 | 2060 |
| 2000 | 2915 | 3124 | 3578 | 3049 | 2306 | 3349 | 2544 | 2984 | 3064 | 2015 |
| 2001 | 2882 | 3047 | 4056 | 3175 | 2370 | 3345 | 2310 | 3148 | 3184 | 1978 |
| 2002 | 2532 | 3151 | 4046 | 3338 | 2388 | 3341 | 2285 | 3081 | 3191 | 1839 |
| 2003 | 2214 | 3201 | 4284 | 3490 | 2399 | 3307 | 2151 | 3281 | 3140 | 2199 |

Source: Statistics Canada, Tuition and living accommodation costs at Canadian universities.

University fees are used as a proxy for university education fees

**Appendix B:
Summary of Observations from Survey Years**

| Year | Female | Male | Total |
|-------------|---------------|-------------|--------------|
| 1977-2003 | 65,971 | 83,009 | 148,980 |
| 1977 | 3,438 | 4,757 | 8,195 |
| 1979 | 3,352 | 4,618 | 7,970 |
| 1981 | 3,512 | 4,721 | 8,233 |
| 1982 | 3,540 | 4,905 | 8,445 |
| 1984 | 3,036 | 4,143 | 7,179 |
| 1985 | 2,851 | 3,797 | 6,648 |
| 1986 | 2,522 | 3,355 | 5,877 |
| 1987 | 3,447 | 4,362 | 7,809 |
| 1988 | 2,790 | 3,584 | 6,374 |
| 1989 | 2,931 | 3,767 | 6,698 |
| 1990 | 3,249 | 4,236 | 7,485 |
| 1991 | 2,957 | 3,933 | 6,890 |
| 1992 | 2,773 | 3,360 | 6,133 |
| 1993 | 2,765 | 3,536 | 6,301 |
| 1994 | 2,854 | 3,494 | 6,348 |
| 1995 | 2,362 | 3,009 | 5,371 |
| 1996 | 2,554 | 2,849 | 5,403 |
| 1997 | 2,376 | 2,924 | 5,300 |
| 1998 | 2,159 | 2,528 | 4,687 |
| 1999 | 2,185 | 2,441 | 4,626 |
| 2000 | 2,003 | 2,168 | 4,171 |
| 2001 | 2,199 | 2,345 | 4,544 |
| 2002 | 2,059 | 2,049 | 4,108 |
| 2003 | 2,057 | 2,128 | 4,185 |

Source: SCF and SLID, various years.

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